

CLAIMS:

1. A method for forming a porous thin film, comprising the step of forming on a substrate a composite thin film in 5 which metal portions composed of a first metal component and metal compound portions composed of a compound of a second metal component different from said first metal component are randomly distributed together, and then, removing only said metal portions from said composite thin film.
- 10 2. A method for forming a porous thin film according to claim 1, wherein said composite thin film is formed by arranging a metal target composed of said first metal component and a metal compound target composed of said 15 compound of said second metal component different from said first metal component in a chamber, and simultaneously applying electric powers to said targets to perform sputtering.
- 20 3. A method for forming a porous thin film according to claim 1 or 2, wherein said metal compound is a metal oxide, metal nitride or metal oxynitride.
4. A method for forming a porous thin film according to 25 any one of claims 1 to 3, wherein said first metal component is at least one metal selected from the group consisting of Zn, Cr, Al, Cu, Si, Ti, Ag, Mn, Fe, Co, Cd, Ni, Zr, Nb, Mo, In, Sn, Sb, Hf, Ta, W, and Mg, and said second metal component is at least one metal different from said first 30 metal component and selected from said group.
5. A method for forming a porous thin film according to any one of claims 1 to 3, wherein said first metal component is at least one metal selected from the group consisting of 35 Zn, Cr, Al, Cu, Si, Ti, Ag, Mn, Fe, Co, Cd, Ni, Zr, Nb, Mo, In, Sn, Sb, Hf, Ta, W, and Mg, and said second metal component is at least one metal different from said first

metal component and selected from the group consisting of Zn, Ti, Nb, In, Sn, Sb and W.

6. A method for forming a porous thin film according to
5 any one of claims 1 to 3, wherein said first metal component
is at least one metal selected from the group consisting of
Zn, Cr, Al, Cu, Si, Ag, Mn, Fe, Co, Cd, Ni, Zr, Nb, Mo, In,
Sn, Sb, Hf, Ta, W, and Mg, and said second metal component is
Ti.

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7. A method for forming a porous thin film according to
any one of claims 1 to 6, wherein said first metal component
and second metal component are in such a combination that
only said metal portions can be dissolved out of said
15 composite thin film in an aqueous acid solution or aqueous
alkali solution.

8. A method for forming a porous thin film according to
claim 7, wherein said removal of said metal portions
20 comprises dissolving said metal portions with said aqueous
acid solution or aqueous alkali solution.

9. A method for forming a porous thin film according to
any one of claims 1 to 8, further comprising the step of
25 conducting baking after said metal portions are removed.

10. A method for forming a porous thin film, comprising
the step of forming on a substrate a composite thin film in
which first metal portions composed of a first metal
30 component and second metal portions composed of a second
metal component different from said first metal component are
randomly distributed together, and then, removing only one
metal portions of said first metal portions and said second
metal portions from said composite thin film.

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11. A method for forming a porous thin film according to
claim 10, wherein said composite thin film is formed by

arranging a first metal target composed of said first metal component and a second metal target composed of said second metal component different from said first metal component in a chamber, and simultaneously applying electric powers to
5 said targets to perform sputtering.

12. A method for forming a porous thin film according to claim 10 or 11, wherein said first metal component is at least one metal selected from the group consisting of Pt, Ru,
10 Ir, Rh, Zn, Cr, Al, Cu, Si, Ti, Ag, Mn, Fe, Co, Cd, Ni, Zr, Nb, Mo, In, Sn, Sb, Hf, Ta, W, and Mg, and said second metal component is at least one metal different from said first metal component and selected from said group.

15 13. A method for forming a porous thin film according to any one of claims 10 to 12, wherein said first metal component and second metal component are in such a combination that said metal portions of only one metal component can be dissolved out of said composite thin film in
20 an aqueous acid solution or aqueous alkali solution.

14. A method for forming a porous thin film according to claim 13, wherein said removal of said metal portions comprises dissolving only one metal portions of said first metal portions and second metal portions with said aqueous acid solution or aqueous alkali solution.
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